

haps in a far longer interval of departmental work. Only as one of his many assistants do I now put on paper my own feelings on the loss we have all sustained. A full record of his service and life can only be written by some officer of the Survey who was closely and long associated with him in his geodetical labours.

General Walker passed out of Addiscombe into the Bombay Engineers in 1844, and landed in India in 1846; he retired in 1883. He was an officer of high training and ability, who worked zealously in his profession, and expected others to do the same, taking a keen interest in their work. He had a good record of hard military service during the Panjab campaign at the Siege of Multan and Battle of Gujarat, and during the Mutiny at the Siege of Delhi, where he was severely wounded; he also served in 1860 with the Mahsood Waziri Expedition. He was as good a field surveyor as a geodesist, with a reputation outside his own corps and country; for twenty-two years in charge of the Trigonometrical Survey, and five years Surveyor-General of India; and he was a constant writer on many subjects relating to geography, almost up to the time of his death. Fuller details of these services are to be found in an excellent obituary notice by Mr. Clements Markham, President of the Geographical Society, in the March number of the *Geographical Journal*.

H. H. G.-A.

NOTES.

LORD KELVIN has communicated to us the following telegram which he has received from Edison: "Just found calcium tungstate properly crystallised gives splendid fluorescence with Röntgen rays far exceeding platino-cyanide rendering photographs unnecessary."

THE Committee of the Athenæum Club, acting under the provisions of the rule of the Club which empowers the annual election by the Committee of nine persons "of distinguished eminence in science, literature, the arts, or for public service," have admitted to membership Prof. Arthur Schuster, F.R.S.

WE regret to announce the death at Madras, on February 14, of Mr. Marmaduke Alexander Lawson, M.A., F.L.S., Government Botanist and Director of Cinchona Plantations to the Madras Government. Mr. Lawson held for many years the posts of Sherardian and Sibthorpean Professor at Oxford, which were separated on his resigning to take up a new position in India in 1882.

THE French Government has decided to continue to M. Pasteur's widow the annual pension of 25,000 francs (£1000) granted to her regretted husband in 1883.

PROF. ARTHUR AUWERS and Prof. Karl Weierstrass, both of Berlin, have been elected foreign members of the Royal Academy of Mathematical and Physical Sciences of Naples, in the place of the late Profs. Cayley and Hermann von Helmholtz.

THE Royal Academy of Mathematical and Physical Sciences of Naples offers a prize of 1000 lire for the best essay (illustrated by specimens) on the geology of the quaternary lakes of the Basilicate. The essays have to be sent in on or before June 30, 1897.

MR. W. L. SCLATER has left England to take up his appointment as Curator of the South African Museum, Capetown. His successor in the science-mastership at Eton College is Mr. M. D. Hill, of the University of Oxford.

MR. EDWIN WHEELER, of Clifton, Bristol, has presented to the Natural History Museum a valuable series of water-colour drawings of fungi—2449 in number—made by him in illustration

of the British fungus flora. The drawings, which fill twelve bulky volumes, represent the result of assiduous labour and observation extending over many years, and the Museum authorities are fortunate in receiving so munificent a gift.

THE "Coral-Reef Expedition," under the command of Prof. Sollas, F.R.S., will shortly leave England for the Pacific. Mr. J. S. Gardiner, of Cambridge, who has been selected as Assistant Naturalist, will devote himself to an examination of the fauna and flora of the Ellice Islands, while a deep hole is being bored into the coral-beds of Funafuti, with the object of ascertaining the depth and exact structure of the formations.

EXCELLENT accounts continue to be received of the progress made by Dr. Forsyth-Major in Madagascar, and several valuable collections made by him have already arrived at the British Museum. Amongst these are numerous remains of the extinct gigantic birds of the family *Epyornithide*, the study of which will, it is expected, considerably increase our knowledge of the structure of this group. The specimens are being examined by the officers of the Geological Department.

AMONGST the natural history collections from British Central Africa, last received from Sir Henry Johnston, is a small series of birds obtained, by Mr. Alexander Whyte, on the previously unexplored mountain of Chiradzulu, half-way between Blantyre and Zomba. With the specimens is an example of a new and very beautiful species of Oriole, which Captain Shelley will describe and figure in the next number of the *Ibis*, as *Oriolus chlorocephalus*.

MR. J. E. S. MOORE, who is gone on a mission from the Royal Society to explore the fresh-water fauna of Lake Tanganyika, arrived at Zomba, British Central Africa, on his way there in December last. He was obliged to stop there on account of the Stevenson Road being blocked by the Arabs; but the road having been since cleared by the Commissioner's forces, will now be open for Mr. Moore's further progress to Lake Tanganyika, where we have no doubt he will reap an abundant harvest.

THE Zoological Society have lost the large male Indian elephant which was brought home by the Prince of Wales on his return from India in 1876, and presented by his Royal Highness to the collection. After carrying an innumerable number of children up and down the walks for the past twenty years, "Jung Pasha" died quite suddenly on the 8th inst. Although tuskless, he was pronounced by all those experienced in such matters to be one of the finest and largest of living Indian elephants. His skin has been presented to the British Museum of Natural History, and is being stuffed for exhibition in the Mammal Gallery.

As a direct outcome of Mr. Saville-Kent's book on "The Great Barrier Reef of Australia," Prof. Alexander Agassiz has, as already briefly announced, determined to undertake an expedition, having as its express object the investigation of the many subjects associated with this vast and specially interesting biological area. Soundings, and an examination of the ocean bottom and the study of the pelagic and surface fauna, are subjects which will especially occupy Prof. Agassiz's personal attention. In order to utilise the opportunities that will be presented to their fullest extent, Prof. Agassiz takes with him a trained staff of artists and assistants, and has also engaged the services of the experienced American collector, Mr. W. Ward, to make typical collections of the Madreporarian corals characteristic of the Great Barrier region; and with the special purpose of securing extra large specimens, for exhibition at the Cambridge, Mass., and other of the United States museums.

Prof. Agassiz has been in communication with Mr. Saville-Kent for some months past with reference to the best season of the year and most favourable localities to adopt as the bases of operation for both himself and collectors, who will work independently. Mr. Saville-Kent has asked Mr. Ward to make a measurement of the selected coral growths at Thursday Island, of which he took photographs and constructed a diagrammatic chart six years since. He has also commissioned Mr. Ward to secure certain of the more appropriate of these types, with their registered accession of growth, as a supplementary addition to the extensive series of the Great Barrier reef and other Australian Madreporaria that he has already contributed to the Natural History Museum.

OUR American correspondent writes, under date March 6 :—Mr. Daniel G. Elliot is on his way to Africa, where he will hunt large game for the Field Columbian Museum of Chicago. He will have charge of 150 men. At a meeting of the Board of Managers of the New York Botanical Garden, held on March 4, it was announced that the following persons had become patrons: J. Pierpont Morgan, Andrew Carnegie, Cornelius Vanderbilt, J. D. Rockefeller, Darius O. Mills, Addison Brown, James A. Scrymser, William C. Schermerhorn, Charles P. Daly, Oswald Ottenborfer, Samuel Sloan, George J. Gould, Miss Helen M. Gould, J. S. Kennedy, William Rockefeller, James S. Constable, Mrs. Esther Herrman (who contributed 10,000 dols., instead of 5000 dols., which was her first intention, as announced in NATURE of February 6), and James R. Pigeon. The Committee on plans and buildings submitted plans for the greenhouse. An acre is to be covered by glass, and a tower sixty feet high is to be erected in the middle. The Committee was authorised to obtain final plans from architects for the large museum which is to be erected. The scientific directors were authorised to purchase for the garden museum the herbarium of Mr. J. B. Ellis, of Newfield, N.J., consisting of 75,000 specimens of fungi.—The storm of March 2–5 was unparalleled at New York City for the protracted severity of the winds, which at one time reached the velocity of eighty-two miles an hour, being two miles faster than any previous record here. Great difficulty was experienced in navigation in the harbour on account of ice, and travel ashore was more interrupted by snow than at any time since the memorable blizzard of March 1888.

IN connection with the affiliation of Photographic Societies with the Royal Photographic Society, six experimentally-illustrated lectures will be delivered upon the subject of "Photography with the Bichromate Salts," beginning on Friday, April 10, and ending on Tuesday, April 28.

A MEETING of the Institution of Naval Architects will be opened in the hall of the Society of Arts, on Wednesday, March 25, and will be continued on the two following days. The Earl of Hopetoun, President of the Institution, will occupy the chair.

THE anniversary meeting of the British Ornithologists' Union has been fixed this year for Wednesday, April 22, when a large attendance is expected. The Union now numbers nearly three hundred members.

THE next Annual Meeting of the American Microscopical Society will be held at Pittsburg, Pennsylvania, from August 18 to 20. The President for the year is Dr. A. Clifford Mercer, of Syracuse, New York.

AMONG the lecturers and their subjects at the Royal Institution after Easter are :—Prof. James Sully, on child-study and education; Mr. C. Vernon Boys, on ripples in air and on water; Prof. T. G. Bonney, on the building and sculpture of Western Europe (the Tyndall Lectures); Prof. Dewar, on recent chemical

progress; Mr. W. Gowland, on the art of working metals in Japan; Dr. Robert Munro, on lake dwellings; and Dr. E. A. Wallis Budge, on the moral and religious literature of Ancient Egypt. The Friday evening meetings will be resumed on April 17, when a discourse will be given by M. G. Lippmann, on colour photography; succeeding discourses will probably be given by Prof. G. V. Poore, Colonel H. Watkin, C.B., Prof. Silvanus P. Thompson, Prof. J. A. Ewing, and Prof. J. A. Fleming, among others.

WE regret to announce the discontinuance of the *American Meteorological Journal* after the forthcoming April number, which ends the twelfth volume. Mr. Robert Ward informs us that the journal has been carried on at a financial loss on the part of the editors ever since its foundation in 1864, and the present step has been decided upon because there seems no hope that it will become self-supporting. Arrangements have been made with the editor of *Science*, whereby Mr. Ward will contribute short notes on, and reviews of, current meteorological publications to that periodical. He therefore hopes authors will send their publications to him in the future as they have done in the past.

THE St. Louis Observatory, at St. Helier, Jersey, is being developed under the able direction of Père Dechevrens, formerly of Zi-ka-wei, in China, well known for his researches on wind, and other subjects in meteorology. This observatory is situated on a small open plateau above the Jesuit College, and one feature of it is a tower, of Eiffel type, about 170 feet high, with spiral staircase, and a number of instruments at the top, connected by a cable of twelve electric wires with recording apparatus in the house. Among these instruments is an anemometer of somewhat special design. A T-shaped support, with orienting arrangement, bears on one arm an anemometer with half cylinders instead of the usual cups, being thus made sensitive, it is claimed, to horizontal currents only; while a helical fan on the other arm gives the vertical component. The *Bulletin* for 1895 (the second year) contains very full information of the various weather elements, including hourly variation of pressure and temperature, and of the velocity of the wind. It is a curious fact, observed at this station, as at the Eiffel Tower in Paris, that the diurnal variation of wind velocity shows an opposite character near the ground and at the top of the tower; in the former case the velocity reaches its maximum about midday, and in the latter about midnight. The climate of the Channel Islands is interesting in many respects, and a well-equipped station like that of St. Louis may be expected to add largely to our knowledge of it.

THE Report of the Meteorological Council for the year ending March 31, 1895, has just been presented to Parliament. The Council have continued the practice of lending instruments to captains of merchant vessels for the purpose of obtaining observations made at sea, and of supplying instruments to the Royal Navy. A very large proportion of logs returned are classed as "excellent," and these observations have been largely supplemented by the Remark Books kept on H.M. ships, and by logs received from the Ocean Steamship Company of Liverpool and others. Among the works actually published, or in course of publication, are charts of the Red Sea, current charts for all oceans, and meteorological charts embracing the area from the Cape of Good Hope to New Zealand. It was for the purpose of collecting and publishing information of use to seamen that the Meteorological Department of the Board of Trade was first established in 1854, as the outcome of the Maritime Conference of Brussels in the previous year. But as time went on, the attention of Admiral FitzRoy was turned to the more practical branch of weather prediction, and this subject now forms an

entirely distinct and important department of the Office. Storm signals are supplied to all ports at which the local authorities will undertake their management. The report shows that the signals were hoisted at 180 stations, but more recently the number has been considerably augmented by their exhibition at exposed lighthouses, for the benefit of passing vessels. Weather forecasts are prepared three times daily, and are also sent to a selected number of agricultural districts during hay-making. A comparison of the results obtained for these forecasts gave a total percentage of 89, which is considered to be very satisfactory. The department dealing with climatology of the British Isles receives observations from 245 stations; the results are collated and published in various forms, available for present or future discussions. Much attention is also paid to the collection of rainfall values, the comparison of various kinds of anemometers, and other researches.

THE report of the Committee, appointed in May of last year, to inquire into the causes of the explosion, and the precautions required to ensure the safety, of cylinders of compressed gas, has now appeared. The Committee, in addition to examining manufacturers of the cylinders in which compressed gases and liquefied gases are sold, and some of the engineers who make and compress the gases, visited works where the manufacture is carried on, and conducted a series of experiments to determine the causes of the accidents to cylinders, and on the amount of damage such explosions are likely to produce. The information thus obtained has enabled them to draw up a detailed statement of the conditions which are necessary to secure safety in the transport and use of compressed gas cylinders, and as to the regulations which would be desirable to prevent risk. The risks of explosion fall into two classes, viz. : (1) risks due to negligence in the manufacture, annealing, and testing of the cylinders; (2) risks due to neglect of precautions in filling the cylinders. As the manufacture is carried on very extensively, and is likely to increase, the Committee think that the risks would be reduced if there were some control of the trade of making cylinders by official inspection. They suggest that there should be a general inspection of all factories manufacturing compressed or liquefied gases. If an inspector were satisfied that the arrangements at any factory were adequate, and that the precautions laid down in this report were being taken, a certificate would be granted authorising such factories to test and mark cylinders. It is suggested that a first thorough inspection, and an occasional inspection subsequently, at intervals of about six months, would be sufficient as a ground for granting and renewing certificates. The report is signed by Profs. W. C. Unwin, C. V. Boys, H. B. Dixon, Dr. A. Dupré, and the Rev. F. J. Smith.

HITHERTO most experiments with the Röntgen rays in this country have been made with the object of photographing living human hands and feet, in which only the bones are represented. On the continent, however, the "new photography" has been employed with remarkable success to delineate the arteries in a hand injected with a substance opaque to the Röntgen rays. Some experiments of this kind are described by Dr. Uberto Dutto, of Rome (*Att. R. Acc. Lincei*). Observing that the opacity of bones to the new rays is probably due to salts of calcium, of which they so largely consist, a human hand was injected with a paste of plaster of Paris sufficiently thin to penetrate the smaller arteries, and as soon as this had hardened, the hand was photographed in the usual way, the Crookes' tube being fixed at sufficient distance from the plate to produce sharp outlines. It would be interesting to try obtaining stereoscopic views of such specimens; this could, no doubt, be readily done by projecting the rays obliquely on the specimen and plate, first from one side

and then from the other. Dr. Dutto points out the great value of this method in facilitating the study of anatomy.

IN one of a series of articles on the use of the Crompton Potentiometer, which he is communicating to *The Electrician*, Mr. Fisher gives some very interesting tests which have been applied to standard Clark cells. The form of cell used is that supplied by Messrs. Muirhead, in which the positive pole consists of a spiral of platinum wire amalgamated and filled with mercury. It is very generally believed that if by any chance a Clark cell becomes short-circuited, then the cell is either totally ruined or only recovers after a very long time. Mr. Fisher has shown that the Clark cell will stand very much rougher usage than one would think, and still recover even in a very short time. In one set of experiments a Muirhead pattern cell had for one minute a potential applied to the terminals of $\frac{1}{100}$ volt in excess of the electro-motive force of the cell. As a result, the electro-motive force rose about three parts in 14,000; but regained its normal value after ten minutes. After short-circuiting for one minute through 500 ohms the electro-motive force fell from 1.4323 volts to 1.431, but recovered its normal value after thirty minutes. Short-circuiting the cell through two inches of No. 18 copper wire for thirty seconds caused a drop from 1.4319 volts to below 1.431; but after thirty minutes it had almost recovered. A cell having been short-circuited through a few inches of copper wire (No. 20) for twenty hours, its electro-motive force fell to 0.17 volt. The recovery was at first very slow, and continued so till it reached 0.5 volt, the average rate of recovery being 0.03 volt per hour. After this the recovery was much more rapid, and in twenty-four hours the cell had almost completely recovered. The effect of applying a constant potential of 1.4 volts to a cell which had been "dead" short-circuited for twenty hours, was to very much hasten the recovery, so that after two and a half hours it had regained its former value. The author has found that the resistance of a Clark cell rises very rapidly if the cell is used to send any appreciable current, and he supposes that whatever is the cause of this increase of resistance and the fall of potential, it is a great measure of the character of a "skin effect." Some tests made of two cells set up by Prof. Fleming in 1886 or 1887, seem to show that when these cells were in continuous use, so that they were employed to send small currents, and had small currents driven through them, their electro-motive forces were in very much better agreement than when standing idle. From these and other experiments the author concludes that the passage of these small currents through standard Clark cells is decidedly beneficial.

The South Slavs have a number of independent folk-songs which, unlike the great Homeric epics, have not been welded into an harmonious whole. Dr. Krauss (*Internationales Archiv für Ethnographie*, vol. ix.) elucidates these songs by notes on various customs and beliefs, especially those relating to death and burial. The South Slavs save money during the whole of life in order to ensure a grand funeral, and they honour graves and graveyards in many ways, considering it a crime to cultivate the ground of a graveyard; but the Catholic priests of Pozega did not hesitate to do so, and grew in them the best cabbages and the largest turnips in the district. There is an amusing account of cuckoo folk-lore in the same journal; and though the legends vary slightly, the cuckoo is regarded by all the South Slavs as a woman changed into a bird for excessive mourning over a dead son or brother.

WE have received from Miss E. A. Ormerod the nineteenth of her valuable "Reports on Injurious Insects," dealing with insect pests which were specially noticeable during 1895. It is fully equal, both in size and importance, to its predecessors, and is

divided into three sections, the first being devoted to insects, &c., injurious to cultivated plants; the second to flies injurious to horses, cattle, &c.; and the third to ticks. In her preface, Miss Ormerod alludes to the fact of the terribly cold weather experienced during January and February, 1895, having had no apparent injurious effect whatever on insect life. She also alludes to the great loss which entomologists have lately suffered by the death of Prof. C. V. Riley. As usual, the report is fully illustrated; but a new and striking feature is the insertion of two full-page illustrations of the foot of the Forest Fly (highly magnified, of course) the thick curved claws of which, as thus represented, present a curious and by no means remote resemblance to a pair of cow's horns. The first insect mentioned in the report is the Eyed Hawk-moth, the larva of which seems to be very injurious to apple-trees at times, though often overlooked from its colour resembling that of the leaves of the tree. As a rule, however, the larger *Sphingide* are rarely common enough in England to be destructive; but it is self-evident that no insects which feed on cultivated plants can be harmless, when unusually abundant. We hope to have the pleasure of receiving Miss Ormerod's annual reports for many years to come. The practical usefulness of entomology was formerly held in doubt; but such reports alone ought to be amply sufficient to remove the last remains of uncertainty on the subject.

IN a paper in the *Transactions* of the English Arboricultural Society for 1895, "On the Effect of Frost on Trees and Shrubs," by Dr. William Somerville, the growth of the Black Austrian Pine is recommended in exposed situations subject to severe cold, that tree having escaped almost entirely unscathed from the effects of the intense frost of the winter of 1894-95.

WE have received the report of the proceedings of the Annual Meeting of the American Microscopical Society, held last year at Cornell University, Ithaca, New York, contained in the *Transactions* of the Society. The address of the President, Mr. S. H. Gage, was on the "Processes of Life revealed by the Microscope: a Plea for Physiological Histology." The volume includes also reports of a number of papers in various departments of microscopy and natural history.

THE *New Bulletin of Miscellaneous Information* for February contains an interesting report of the result of an inquiry on a point of some importance to the Excise, the presence of natural sugar in tobacco. It has been established that saccharine matter may be present in unadulterated Virginian tobacco to the extent of 15.2 per cent., and even in tobacco grown in this country to the extent of 9 per cent. Dr. Hugo Müller is of opinion that the sugar is not in the form of either lævulose or glucose, but that it is composed of at least three different carbohydrates which appear to be new to chemistry.

PRINCE BALTHASAR BONCOMPAGNI's heirs have decided to sell his valuable library in the Palais Cenci, Rome. The library comprises more than eleven thousand different works, and will be sold *en bloc*. The Mathematical Section contains a very rare collection of works on arithmetic; and there are also numerous works on natural science and archæology in the library. Applications for catalogues should be sent to M. l'Avv. Francesco Sirani, 14 via del Nazareno, Rome.

THE thirty-third annual issue of that most useful publication, "The Statesman's Year-Book" (Macmillan), edited by Mr. Scott Keltie, with the assistance of Mr. J. P. A. Renwick, has just come to hand. A new feature, which will be much appreciated by the numerous people who consult the annual, is the insertion of four coloured maps, to illustrate the Anglo-Russian delimitation of the Pamirs, the Anglo-French arrangement with

respect to Siam, the British Guiana and Venezuela boundary dispute, and recent arrangements in Bechuanaland.

A PAPER on the progress of science in England from the seventh to the thirteenth century inclusive, read before the Manchester Literary and Philosophical Society, appears in the number of the *Memoirs* of the Society just received (vol. x. No. 1, 1895-96). Other papers to which attention may well be directed are: "On Helium and its place in the Natural Classification of Elementary Substances," and "The Indefinite Quantitative Relations of the Physical and Chemical Forces," both by Dr. Henry Wilde, F.R.S., and an account of "Experiments on the Latent Heat of Steam," by Dr. J. A. Harker.

THE second volume of "Contributions to Canadian Palæontology" (*Geol. Surv. Canada*) consists of three papers on Arthropoda, by S. H. Scudder. Of these the most generally interesting one is that describing certain Myriapods and Scorpions from the famous hollow trunks of Sigillarians found in the coalfields of Nova Scotia. Another group of palæontological papers from the same region come from the *Transactions* of the Royal Society of Canada. They contain descriptions, by J. F. Whiteaves, of Cretaceous fossils from British Columbia, which afford some confirmation of Dr. Kossmat's views as to the distribution of Cretaceous land and sea, summarised some months back in these columns.

A DETAILED account of the Upper Palæozoic (Permian and Carboniferous) formations of Central Kansas, by C. S. Prosser, is to be found in the *Journal of Geology*, vol. iii. No. 7. The importance of this region in the general correlation of these beds has long been recognised, since here, unlike the Eastern States, coal is rare, and there is an almost unbroken series of marine strata from Carboniferous to Permian. The author shows that the Carboniferous brachiopod fauna does not extend as high as had previously been asserted, and that the higher beds contain a characteristic Permian lamellibranch fauna. He is thus able to draw a fairly definite line between Carboniferous and Permian (or Permo-Carboniferous), which he draws, for convenience of mapping, at the top of certain fossiliferous shales overlying the *Fusulina*-limestone. According to these views, Waagen, in his correlation of the Upper Palæozoic strata of India and of other countries, drew the base of the Permo-Carboniferous in the Western States too low; but this correction does not affect the general value of his correlation.

A NEW monthly review—the *Revue de l'Université de Bruxelles*—has made its appearance, its foundation being a sign of the era of prosperity and expansion inaugurated by the creation of the new institutes with which the "Université libre" has lately been endowed. The review is not to be the organ of any particular school of thought, but will include within its purview history, philosophy, science, social economy, and all branches of higher education. It is intended to be the focus of all the efforts made in the University world, and particularly in the Université libre de Bruxelles, for the advancement of science and study. The first two numbers of the new publication contain articles on penal law; great biological discoveries made during this century; the Botanic Garden at Buitenzorg; constitutional law; the work of Hittorf, Lenard, Goldstein, and Röntgen; and the International University Alliance.

THE twenty-sixth volume of the *Proceedings* of the London Mathematical Society, containing the papers read before the Society during the session 1894-95, has come to hand. In Mr. A. B. Kempe's presidential address, with which the volume opens, definitions of mathematics are discussed, and a new one formulated. According to dictionaries, mathematics is "the

science of number and magnitude," "the science which treats of the properties and relations of quantities," or more briefly, "the science of quantity." Occasional definitions of a more comprehensive character are to be found scattered here and there in mathematical and other writings, but Mr. Kempe doubts whether any of them would satisfy a large body of modern mathematicians; therefore he suggests the following as a provisional definition: "Mathematics is the science by which we investigate those characteristics of any subject-matter of thought which are due to the conception that it consists of a number of differing and non-differing individuals and pluralities." Perhaps this definition will provoke some one to formulate another.

THE playgrounds of our public schools are said to be the arenas in which British battles are fought; and, in a similar sense, we may say that the scientific societies of our colleges are the training schools of scientific investigators. The system of compulsory games tends greatly to limit the time which public schoolboys can devote to natural history or other research, but a few enthusiasts contrive to gratify their curiosity to know something about natural facts and things. The twelfth annual report of the Felsted School Scientific Society testifies to the existence of this spirit of inquiry. Among the papers it contains, we notice one on "The Geology of Felsted," by Mr. J. French, and another on "Recent and Proposed Arctic Exploration," by Mr. J. F. Hartin. The Society used only to be concerned with natural science, but its field of operations has been enlarged, and its usefulness increased, by the creation of a Chemical Section. Stern methods are taken to keep up the attendances at the meetings, for we read: "That any member failing to attend at least one ordinary general meeting in each term in which such meetings are held, without reasonable excuse, be liable to ejection from the Society." It is appalling to think what would be the result of the application of this rule to many learned societies.

A LARGE number of students, as well as persons who do not pretend to possess any special scientific culture, will be glad to know that Tyndall's "Glaciers of the Alps" (Longmans, Green, and Co.), first published nearly six-and-thirty years ago, and for a long time out of print, has been reprinted. Upon Lord Kelvin's advice, no changes have been made in the controversial portions of the book, so the text has been left practically unaltered. Messrs. Kegan Paul and Co. have published a popular edition of Sir John Lubbock's standard work on "Seedlings," reviewed in these columns in January 1893 (vol. xlvii. p. 243). The parts included in the new volume are those of most general interest, and 282 of the 684 illustrations in the original work are used to elucidate the text. A new edition has been published of "Griffin's Electrical Engineers' Price-Book," edited by Mr. H. J. Dowsing. Nearly seventy pages of new matter have been added, and the whole of the prices have been brought up to date. Electrical and other engineers and contractors know that the volume is a ready and trustworthy means of reference to the prices with which they have to deal. The new and improved edition of "Historical and Future Eclipses," by the Rev. S. J. Johnson, just published by Messrs. James Parker and Co., will be appreciated as fully as the original little volume, which came out twenty-one years ago. The book is extremely handy, and contains not only a vast amount of interesting information with regard to eclipses of past and future time, but also notes on planets, double stars, and other celestial matters, thus making it valuable to practical astronomers.

THE additions to the Zoological Society's Gardens during the past week include a Campbell's Monkey (*Cercopithecus campbelli*, ♂) from West Africa, presented by Miss Lilian Frost;

two Black-backed Jackals (*Canis mesomelas*), a Puff Adder (*Vipera arietans*) from South Africa, presented by Mr. J. E. Matcham; a Condor (*Sarcorhamphus gryphus*) from South America, presented by Mr. C. J. Wedderburn; a Guillemot (*Lomvia troile*), British, presented by Mr. J. L. Palmer; a Moorish Tortoise (*Testudo mauritanica*), from North Africa, presented by Mrs. Powell; a White-crowned Mangabey (*Cercocebus ethiops*, ♀) from West Africa, an Isabelline Lynx (*Felis isabellina*, ♂) from Ladakh, Cashmere, deposited; a Maguari Stork (*Dissura maguari*), a Guira Cuckoo (*Guira piriirigui*), a Burrowing Owl (*Speotyto cunicularia*), a Brown Milvago (*Milvago chimango*), a Condor (*Sarcorhamphus gryphus*), a Boa (*Boa constrictor*) from South America, six Mexican Quails (*Callipepla squamata*) from Mexico, a Scarlet Tanager (*Ramphocelus brasilius*), three Scarlet Ibises (*Eudocinus ruber*) from Para, a Ruff (*Machates pugnax*), two Redshanks (*Totanus calidris*), British, purchased.

OUR ASTRONOMICAL COLUMN.

VARIABLE STAR CLUSTERS.—The recent announcement by Prof. Pickering, of the discovery of variability in a large number of stars forming parts of star clusters (NATURE, vol. liii. p. 91), has led Dr. Belopolsky to examine some of the photographs of clusters taken at Pulkowa. Two photographs of the cluster M3 (N.G.C. 5272), in Canes Venatici, were taken in March 1894, and two more in April 1895. In the later photographs one star was found to be two magnitudes brighter than in 1894, and differences of brightness can also be traced in the case of other stars among the 1800 shown upon the photographs (Ast. Nach., 3338). The Arequipa negatives of the same cluster indicated a variation of brightness in eighty-seven stars, amounting in some cases to at least two magnitudes.

THE SPOTS ON SATURN.—The inability of Prof. Barnard to detect any spots on Saturn with the aid of the Lick telescope may possibly have thrown some doubt upon the existence of such spots. Nevertheless, the observations of them by Mr. Stanley Williams have given such remarkably consistent results, that it is difficult to believe them illusory. In a recent article (Observatory, March, p. 112) Mr. Williams points out that there has been some misconception as to the nature of the Saturnian spots and the conditions for their satisfactory observation. While generally admitting the superiority of large telescopes, Mr. Williams holds that the spots on Saturn are such as to require a sight specially trained for their observation. The characteristics of the spots are (1) considerable size, (2) faintness, (3) extreme indefiniteness. The bright equatorial spots average about 2" in diameter, while the dark spots on the broad double belt in the northern hemisphere have sometimes appeared as large as 4" long by 2" or 3" broad. Similar spots have been noted by other observers, and the estimated positions have been sufficiently accordant to make it probable that the same objects were observed.

The planet will be in opposition on May 5, and it is to be hoped that the spots will receive the attention of observers. The spots appear to be best seen with low powers; with a power of 140 an equatorial spot has been observed to shine with almost stellar brightness, but with higher powers this peculiar brilliancy disappeared. Another point in Mr. Williams' experience is worth putting on record, namely, that in the south of England, at least, definition is usually much better about the time of sunset and for an hour afterwards than at other times.

COMPUTATION OF THE TIMES OF SOLAR ECLIPSES AND OCCULTATIONS.—In the *Revista do Observatorio* (Rio de Janeiro) for 1886, an account was given of a graphical method by which the approximate times of occurrences of solar eclipses and occultations, sufficiently accurate for first approximations, could be determined. Three years later, in a subsequent *Revista*, an application of this method to the eclipse of the sun of December 22, 1889, was made by Mr. Morize, of the Observatory of Rio. With the idea of making this method more general and applicable for all latitudes, the Director of the Observatory, Mr. L. Cruls, has published a short account of the method, simplified both as regards the computations and the graphical construction. The principle is based on the parallactic displacement of the moon in right ascension and polar distance, the values of which